

College of SCIENCE
Department of PHYSICS
Bachelor of Arts in PHYSICS
Major in PHYSICS
Physics Education Option

For student date of entry under UG Catalog 2021-2022

A hashtag (#) indicates a course with prerequisites or corequisites.
These are listed below.

I. Pathways to General Education Requirements (49 credits)

Concept 1 Discourse (9 credits)

6 credits in foundational courses. The following course sequence is required of all students majoring in Physics within the B.A. Degree in Physics.

ENGL 1105 First-year Writing	3	
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ENGL 1106 First-year Writing	3	
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3 credits in advanced or applied writing or speaking courses.

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Concept 2 Critical Thinking in the Humanities (6 credits)

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	3	
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Concept 3 Reasoning in the Social Sciences (6 credits)

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	3	
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Concept 4 Reasoning in the Natural Sciences (8 credits) The following course sequence is required of all students majoring in Physics within the B.A. Degree in Physics.

# PHYS 2305-2306 Foundations of Physics		
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4	
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Concept 5 Quantitative and Computational Thinking (11 credits)

8 credits in foundational courses. The following course sequence is required of all students majoring in Physics within the B.A. Degree in Physics.

MATH 1225 Calculus of a Single Variable	4	
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MATH 1226 Calculus of a Single Variable	4	
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3 credits in advanced or applied courses. The following course is required of all students majoring in Physics within the B.A. Degree in Physics.

# MATH 2214 or # MATH 2214H Introduction to Differential Equations	3	
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Concept 6 Critique and Practice in Design and the Arts (6 credits. 3 in design + 3 in arts, or 6 in integrated design & arts)

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	3	
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Concept 7 Critical Analysis of Identity and Equity in the United States (3 credits)

	3	
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II. Physics Bachelor of Arts Core Courses (21 credits)

# PHYS 2504 Mathematical Methods in Physics	3	
PHYS 3314 Intermediate Laboratory	3	
# PHYS 3324 Modern Physics	4	
# PHYS 3355 Intermediate Mechanics	3	
# PHYS 3405 Intermediate Electricity and Magnetism	3	
# PHYS 3704 Thermal Physics	3	
# PHYS 4315 Modern Experimental Physics	2	

III. Additional Required Courses for the Bachelor of Arts in Physics, Major in Physics, Physics Education Option (16-17 credits)**

# PHYS 2325-2326 Seminar for Physics Majors	1		1	
# PHYS 3655 Introduction to Astrophysics or # PHYS 3656 Introduction to Astrophysics	3			
# MATH 2114 Introduction to Linear Algebra or # MATH 2114H Introduction to Linear Algebra	3			
# MATH 2204 Introduction to Multivariable Calculus or # MATH 2204H Introduction to Multivariable Calculus	3			
# MATH 3214 Calculus of Several Variables	3			
CS 1044 Introduction to Programming in C or CS 1054 Introduction to Programming in Java or CS 1064 Introduction to Programming in Python or CS 1114 Introduction to Software Design or # ECE 1574 Engr Problem Solving with C++ or # AOE/ESM 2074 Computational Methods	2 or 3			

* MATH 1225-1226 (#) and MATH 2214 (#) or MATH 2214H (#) and PHYS 2305-2306 (#) are also required of all Physics Majors within the B.A. Degree Program in Physics. They are listed in Section I above.

IV. Science Courses for the Physics Bachelor of Arts, Physics Education Option (20-22 credits). Choose one of these four emphases:

Astronomy Emphasis (22 credits)
PHYS 1055-1056 Introduction to Astronomy
PHYS1155-1156 Astronomy Laboratory
PHYS 2114 Black Holes
PHYS 3154 Observational Astrophysics
PHYS 3655 Introduction to Astrophysics** or # PHYS 3656 Introduction to Astrophysics**
BIOL 1105 Principles of Biology
CHEM 1035 General Chemistry

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2	
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3	
3	

** Exclusive of the choice made in Section III.

Biology Emphasis (20 credits)
BIOL 1105-1106 Principles of Biology & BIOL 1115-1116 Principles of Biology Laboratory
BIOL _____**
BIOL _____**
PHYS 1055 Introduction to Astronomy or GEOS 1004 Earth Science: Our Past, Present, and Future
CHEM 1035 General Chemistry

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1	

*** 2000-level or higher. These courses may have prerequisites or corequisites.

Chemistry Emphasis (20 credits)
CHEM 1035-1036 General Chemistry
CHEM 1045-1046 General Chemistry Laboratory
CHEM _____**
CHEM _____**
PHYS 1055 Introduction to Astronomy or GEOS 1004 Earth Science: Our Past, Present, and Future
BIOL 1105 Principles of Biology

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*** 2000-level or higher. These courses may have prerequisites or corequisites.

Geology Emphasis (20 credits)
GEOS 1004 Earth Science: Our Past, Present, and Future
GEOS 1104 Introduction to Earth Sciences Laboratory
GEOS 1024 Earth Resources, Society, and Environment
GEOS 1124 Earth Resources, Society, and Environment Laboratory
GEOS _____**
GEOS _____**
BIOL 1105 Principles of Biology
CHEM 1035 General Chemistry

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3	
3	

*** 2000-level or higher. These courses may have prerequisites or corequisites.

V. Restricted Electives (one course from the list below, 3 credits)

# PHYS 4254 Quantum Information Technologies	3	
# PHYS 4504 Introduction to Nuclear and Particle Physics	3	
# PHYS 4554 Introduction to Solid State Physics	3	
# PHYS 4564 Polymer Physics	3	
# PHYS 4574 Nanotechnology	3	
# PHYS 4614 Optics	3	
# PHYS 4654 Modern Cosmology	3	
# PHYS 4674 Introduction to General Relativity	3	
# PHYS 4714 Introduction to Biophysics	3	
# PHYS 4755 Introduction to Computational Physics	3	
# PHYS 4774 Introduction to Physics of Galaxies	3	

VI. Free Electives (8-11 credits)

Accepted Substitutions

- PHYS 3355: AOE 3154 (Astromechanics), or ESM 3124 (Dynamics II Analytical and 3-D Motion).
 PHYS 3405: ECE 3105 (Electromagnetic Fields).
 PHYS 3314: AOE 3054 (AOE Experimental Methods), or ECE 2204 (Electronics) & ECE 2274 (Electronic Networks Laboratory I), or ESM 3444 (Mechanics Laboratory).

Foreign Language Requirement

Students who did not successfully complete at least two years of a single foreign, classical, or sign language during high school must successfully complete six credits of a single foreign, classical, or sign language at the college level. Courses taken to meet this requirement do not count toward the credits required for graduation. Please consult the Undergraduate Course Catalog for details.

Satisfactory Progress Toward Degree

A student will be certified as making satisfactory progress toward the B.A. degree in Physics by satisfying the university's academic eligibility requirements, as well as the following requirements:

- Upon having attempted 60 credit hours, the student will have completed Section I Concept 1 requirements, the Mathematics requirements (in Sections I and III) as well as PHYS 2305-2306 (Section 1 Concept 4), PHYS 2325-2326, PHYS 2504, and PHYS 3324.
- Upon having attempted 45 credit hours, the student must have 2.0 overall and in-major GPAs. All PHYS courses attempted are used in the calculation of the in-major GPA. Non-PHYS courses used as Accepted Substitutions are not used in the calculation of the in-major GPA.
- Upon having attempted 72 credit hours, the student will have completed the foreign language requirement by the close of the academic year (spring semester). [College of Science requirement]
- Upon having attempted 96 credit hours, the student will have completed all credits for the Pathways to General Education.

Outcomes Assessment

Each student is required to participate in the department's Outcomes Assessment procedures as determined by each year's

Undergraduate Program Committee and approved by the Department Chair.

Minimum hours and GPA required for graduation

A minimum of 120 credit hours must be completed for graduation. A minimum overall and in-major GPA of 2.0 is required for graduation. All PHYS courses attempted are used in the calculation of the in-major GPA. Non-PHYS courses used as Accepted Substitutions are not used in the calculation of the in-major GPA.

Prerequisites and Corequisites

Courses in this checksheet marked with a hashtag (#) have prerequisites or corequisites. These are detailed below. Please check with your advisor or consult the Undergraduate Course Catalog.

List of prerequisites and corequisites

PHYS 2305-2306: Pre: (MATH 1205 or MATH 1205H or MATH 1225) or (MATH 1206 or MATH 1206H or MATH 1226) for 2305; (MATH 1206 or MATH 1206H or MATH 1226), PHYS 2305 for 2306 and Co: 2325 or (MATH 1206 or MATH 1206H or MATH 1226) for 2305

PHYS 2504: Pre: 2305; Co: MATH 2214, MATH 2224, 2306

PHYS 3324: Pre: 2306; Co: MATH 2214, 2504

PHYS 3355: Pre: (MATH 1224 or MATH 2204 or MATH 2204H), (MATH 2214 or MATH 2214H), PHYS 2305, PHYS 2306, PHYS 2504

PHYS 3405: Pre: (MATH 2214 or MATH 2214H), PHYS 2305, PHYS 2306, PHYS 2504

PHYS 3704: Pre: 2306, 3324; Co: MATH 2214, 2504

PHYS 4315: Pre: 3314

PHYS 2325-2326: Co: 2305 for 2325; 2306 for 2326

MATH 2114: Pre: MATH 1225 or MATH 1226

MATH 2114H: Pre: MATH 1225 or MATH 1226

MATH 2204: Pre: MATH 1226

MATH 2204H: Pre: MATH 1226

MATH 2214: Pre: (1114 or 2114 or 2114H or 2405H), 1226

MATH 2214H: Pre: (1114 or 2114 or 2114H or 2405H), 1226

MATH 3214: Pre: MATH 2224 or MATH 2224H or MATH 2204 or MATH 2204H or MATH 2406H or CMDA 2005

ECE 1574: Pre: (ENGE 1024 or ENGE 1215 or ENGE 1414), MATH 1205 or (MATH 1205H or MATH 1225)

AOE 2074 (ESM 2074) 2 credit hour course: ENGE 1114 or ENGE 1216 or ENGE 1434

PHYS 1155, 1156: Co: 1055 for 1155; 1056 for 1156

PHYS 3154: Pre: 1156

PHYS 3655: Pre: 2306

PHYS 3656: Pre: 2306

BIOL 1115,1116: Co: BIOL 1105 for BIOL 1115; BIOL 1106 for BIOL 1116

CHEM 1035-1036: Co: MATH 1025 or MATH 1225

CHEM 1045-1046: Co: CHEM 1035 for CHEM 1045; CHEM 1036 for CHEM 1046

PHYS 4254: Pre: 2306, (MATH 2114 or MATH 2114H)

PHYS 4504: Co: 4456

PHYS 4554: Co: 4456

PHYS 4564: Pre: 2306

PHYS 4574: Pre: 2205, 2206 or 2305, 2306

PHYS 4614: Pre: 2306, MATH 2214, (MATH 2224 or MATH 2204 or MATH 2204H)

PHYS 4654: Pre: 3656

PHYS 4674: Pre: MATH 2214 or MATH 2214H or MATH 2514, PHYS 3356; Co: 3406

PHYS 4714: Pre: 2206 or 2306 or ISC 2106H

PHYS 4755: Pre: CS 1054 or CS 1064 or CS 1114 or ECE 1574 or AOE 2074 or ESM 2074

PHYS 4774: Pre: 3656